

Supplementary Data5 Spatial Cueing Task No Masks Control (#52045)

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1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

This is a control experiment of the spatial cueing Task without masking. We predict that without masking both the 33ms cues and the 250ms will more likely be consciously accessible, and this will increase the likelihood of participants becoming aware of the incongruency of the cues. We predict that those who will become aware of the cues predictive value will exert a facilitation. We will test the facilitation on incongruent trials (or rather its potential interference) in comparison to the control baseline trials consisting of two cues bearing no informative information about the target location.

We thus predict that participants aware of the cues' predictability in both the 33ms and 250ms conditions will be faster on the incongruent cues than the two-cues baseline control. We anticipate that this facilitation will take a short time to develop once participants become aware and become stable once the learning is established (will be optimal towards the end of the task). In contrast, we anticipate that participants who will not be aware of the cues or their predictive value, will not be facilitated, nor present gradual learning improvement. We note that even if both the 33ms and 250ms cues are consciously accessible, not all participants may become aware of their predictive value, as some may deliberately try to ignore them and can consider them distracting. These participants are predicted to not obtain facilitations. The awareness of these cues will be monitored, and reported strategies to perform this task fast will be documented and analyzed as participants "cues predictive value awareness" separating factor. We also predict that the order in which participants receive the 250ms condition or the 33ms condition first, might have an effect on participants awareness of the cues and their predictability. We further anticipate that error rates will be minimal, yet when they happen, they will occur less often on incongruent cues than baseline two cues (for participants who became aware of the cues' predictability and establishing learning).

3) Describe the key dependent variable(s) specifying how they will be measured.

The dependent variables will be reaction time and error rates. Participants will be presented with a target (a treasure chest) presented either on the left/right sides of the screen in a location that is always incongruent with the single cue that appears before the target (or orthogonal with respect to the two-star cues control). Participants must respond as quickly and accurately as possible to the side the target appeared using the computer keys and the response times and error rates will be measured. We will also use a second measure of verbal response strategy. Participants will be asked at the end of the experiment if they have used any strategy to complete the task, and we will count the number of participants reporting to strategically go to the opposite of the cue in all conditions (and divide the participants based on these responses considered to represent awareness to the cues' predictive value). We will also include an objective identification task of the start origin to identify if participants can become aware of these cues once notified on their presence.

4) How many and which conditions will participants be assigned to?

We will test participants in two conditions (a) 33ms and (b) 250ms in two modalities. In each of these, 80% of the trials will be with a one-star cue that is incongruent with the target, and 20% with two stars that are orthogonal with the target.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

- (a) We will compare the response times of the 33ms incongruent cue with the 250ms incongruent cue.
- (b) In addition, in each of the conditions (33ms and 250ms) separately, we will compare the response time to respond on incongruent single cue trials vs. the two cues. And potentially also test the interaction between the two conditions (33ms vs. 250ms) and cues (one vs. two).
- (c) We will additionally plot the response time learning curves over blocks of trials in both conditions (particularly for the conditions randomized first).
- (d) We will perform the above analyses for error rates too. Though we anticipate these will be minimal/negligible.

We will analyze all the above critical comparisons using linear mixed models on log transformed response times

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

- (a) Response times of only correct target selections will be included in the response time analysis
- (b) We will exclude trials with reaction times that are slower than 2 standard deviations of the mean of the specific block for each participant.
- (c) We will exclude participants with over than 10% of errors in some/all blocks.
- (d) We will exclude any participant attesting to having an attention disorder.

(e) we will exclude participants whose screen refresh rate did not allow presenting the 33ms cues at the specified duration.

7) How many observations will be collected or what will determine sample size? No need to justify decision, but be precise about exactly how the number will be determined.

We are willing to test up to 64 participants. However, because this might represent an unnecessarily expenditure of resources, we will use a sequential testing design¹. Thus, we will test a minimum of 32 participants. Once this minimum number of participants has been obtained we will test for our effect using a p-value corrected for sequential testing in 3 time points calculated via the GroupSeq package in R based with Hwang-Shih-DeCani family correction with a phi of 1; for example, if we test the minimum of 32 participants at the first time point this will require $p < .0311$ to confirm our hypothesis and stop testing. If we do not reach this alpha we can continue for time point t2 with 75% of our maximum participants (48) with the specified corrected alpha of t2 $< .0229$. Or finally if required we will test at the last time point t3 with our maximum set number of participants - 64 with a corrected alpha of $p < .0218$.

1. Lakens D (2014) Performing high-powered studies efficiently with sequential analyses. European Journal of Social Psychology 44, 701–710. DOI: 10.1002/ejsp.2023

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)